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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,461	02/15/2006	Yasuo Kobayashi	33082M300	1005

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EXAMINER	
PATEL, REEMA	

ART UNIT	PAPER NUMBER
2812	

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12/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/568,461	KOBAYASHI ET AL.	
	Examiner	Art Unit	
	Reema Patel	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to an amendment filed on 9/28/07.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-5 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Sugahara et al. (U.S. 5,989,998).

3. Regarding claim 1, Sugahara et al. discloses a semiconductor device comprising an insulation film consisting of a fluoridation carbon film that has been subjected to thermal history of 420 °C or lower, wherein an amount of hydrogen atoms included in the fluoridation carbon film is 3 atomic % or less before the fluoridation carbon film is subjected to the thermal history (col 13, lines 12-20, 27-30, 37-41).

4. Regarding claim 2, Sugahara et al. discloses that the insulation film is an interlayer insulation film (col 13, lines 12-17).

5. Regarding claim 3, Sugahara et al. discloses a manufacturing method of a semiconductor device comprising the steps of:

- Generating a plasma of a source gas consisting of a chemical compound of carbon and fluorine and including hydrogen atoms of 1 x 10^{-3} atomic % or less (col 13, lines 15-18)
- Forming an insulating film consisting of a fluoridation carbon film that includes hydrogen atoms of 3 atomic % or less, on a substrate, by using the plasma of the source gas (col 13, lines 12-20, 27-30)

6. Regarding claim 4, Sugahara et al. discloses heating the substrate at a temperature of 420 °C or lower, after the step of forming the insulation film (col 13, lines 37-41).

7. Regarding claim 5, Sugahara et al. discloses the use of a fluorinated carbon compound, which has a triple bond of the carbon atoms (col 4, lines 50-55). Since the formula C_5F_8 can encompass a linear structure containing one triple bond between carbon atoms, Sugahara et al. anticipates the use of C_5F_8 as the as the fluorinated carbon compound.

8. Regarding claim 12, Sugahara et al. discloses a gas for a plasma CVD process, comprising an unsaturated carbon fluoride compound and hydrogen atoms in the amount of 1 x 10^{-3} atomic % or lower (col 13, lines 59-65).

9. Claims 6 and 9-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Hirayama et al. (U.S. 6,884,365 B1, hereinafter 'Hirayama').

10. Regarding claims 6 and 9-11, Hirayama discloses a gas for a plasma CVD process, comprising an unsaturated carbon fluoride compound (octafluorocyclopentene) and a chemical compound including a hydrogen atom (H_2O), the amount of the

chemical compound including a hydrogen atom being 20 weight ppm or less (col 8, lines 45-53). Hirayama discloses bringing the gas mixture into contact with an adsorbent (col 9, lines 8-18).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirayama et al. (U.S. 6,884,365 B1, hereinafter 'Hirayama') as applied to claim 6 above.

13. Regarding claims 7-11, Hirayama discloses a gas for a plasma CVD process, comprising an unsaturated carbon fluoride compound (octafluorocyclopentene) and a chemical compound including a hydrogen atom (H_2O) (col 8, lines 46-53) are brought into contact with an adsorbent (col 9, lines 8-18). Furthermore, Hirayama discloses the amount of the chemical compound including a hydrogen atom being 0-20 weight ppm (col 8, lines 45-53). It would have been obvious to one having ordinary skill in the art at the time the invention was made to select a concentration of chemical compound including a hydrogen atom to be 3 ppm or less, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233. Moreover, one of ordinary skill in the art would recognize the advantage of selecting a very low concentration of chemical

compound including a hydrogen atom, such as 3 weight ppm or less, is a purer source gas. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select a concentration of chemical compound including a hydrogen atom to be 3 weight ppm or less so as to obtain a purer source gas.

14. Regarding claims 13-14, Hirayama discloses a gas for a plasma CVD process, comprising an unsaturated carbon fluoride compound (octafluorocyclopentene) and water (col 8, lines 46-53) is brought into contact with an adsorbent (col 9, lines 8-18). Furthermore, Hirayama discloses the amount of water is 0-20 weight ppm (col 8, lines 45-53). It would have been obvious to one having ordinary skill in the art at the time the invention was made to select a concentration of water to be 0.1 ppm or less, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233. Moreover, one of ordinary skill in the art would recognize the advantage of selecting a concentration of water to be very low such as 0.1 weight ppm or less is a purer source gas. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select a concentration of water to be 0.1 weight ppm or less so as to obtain a purer source gas.

15. Claims 15, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugahara et al. (U.S. 5,989,998) as applied to claims 1, 3, and 12 above respectively.

16. Regarding claims 15-17, Sugahara et al. discloses an embodiment of generating a plasma of a source gas consisting of a chemical compound of carbon and fluorine, including 0 atomic % of hydrogen atoms (col 13, lines 15-18) and forming an insulating film consisting of a fluoridation carbon film that includes 0 atomic % of hydrogen atoms, on a substrate, by using the plasma of the source gas (col 13, lines 12-20, 27-30). Sugahara et al. also discloses other embodiments within the same invention where the source gas includes more than 0 atomic % of hydrogen to form a fluoridation carbon film including more than 0 atomic % of hydrogen atoms (col 11, line 60 – col 12, line 67).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to select the source gas to contain an atomic % of hydrogen atoms within this range so as to form a fluoridation carbon film containing an atomic % of hydrogen within a range greater than zero but less than an arbitrary amount, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233. Moreover, one of ordinary skill in the art would recognize the advantage of selecting a particular atomic percentage of hydrogen within the source gas allows for a specific atomic percentage of hydrogen in the formed carbon fluoridation film, which can be adjusted based on factors such as dielectric constant.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the source gas have $0\text{-}1x10^{-3}$ atomic % of

hydrogen to form a film of 0-3 atomic % of hydrogen so as to adjust the dielectric constant of the fluoridation carbon film.

Response to Arguments

17. Applicant's arguments with respect to the rejection(s) of claim(s) 6-11 and 13-14 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Hirayama et al. (U.S. 6,884,365 B1) (see above).

18. Applicant's arguments filed with respect to the rejection(s) of claim(s) 1-5 and 12 have been fully considered but they are not persuasive.

19. Applicant argues that "a small amount of hydrogen necessarily exists in the source gas as an impurity in the form of water that has not completely been removed...when a fluoridation carbon film is formed by using the source gas including the small amount of hydrogen as impurities, the formed film necessarily includes a larg eamount of hydrogen atoms" (page 7). This is not persuasive as Sugahara et al. (U.S. 5,989,998) discloses that the source gas contains no hydrogen which allows for a film containing only carbon and fluorine atoms (col 13, lines 27-32).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reema Patel whose telephone number is 571-270-1436. The examiner can normally be reached on M-F, 8:00-4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MICHAEL LEBENTRITT
SUPERVISORY PATENT EXAMINER

RSP
12/19/07